

Figure 4. Greenhouse gas emissions and total new area impacted with a cap-and-trade system.

Arrows depict the difference between the Reference Scenario, with no cap-and-trade system, and three other scenarios where a cap-and-trade system is implemented. Greenhouse gas emissions measured in million tonnes of carbon dioxide equivalent.

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Our results stress the importance of energy conservation for reducing energy sprawl. Relative to the Reference scenario, all cap-and-trade scenarios involve a reduction in energy consumed (Fig. 1B), because of energy efficiency and foregone consumption due to higher energy prices. This energy conservation is primarily in the electricity market, which is more elastic than demand for liquid fuels. Electricity conservation avoids impacts on at least 49,600 km² in the Core Cap-and-Trade scenario, while at least 2,500 km² will be saved due to liquid fuel conservation, compared to the Reference scenario. EIA assumptions about the potential for energy conservation are relatively modest [19] and some groups argue that energy conservation has greater potential [20].

Habitat impacts

The major terrestrial habitat types (Fig. 2) impacted domestically by energy development varied among energy production technique (Table 1). Regardless of scenario, the major habitat types with the most new area affected, summing over all energy production techniques, are Temperate Deciduous Forests and Temperate Grasslands (Supplementary Data S2). In the Reference scenario, Temperate Deciduous Forests have between 95,000 km² (most compact estimate) and 229,000 km² (least compact estimate) impacted, while Temperate Grasslands have 65,000–168,000 km² impacted. In the Core Cap-and-Trade scenario these types have 119,000–254,000 km² and 88,000–191,000 km² impacted, respectively. Patterns of total new areal impacts are driven by biofuel production, which peaks in these two habitat types. Biomass burning for electricity and coal mining are also concentrated in Temperate Deciduous Forests and Temperate Grasslands. Wind production onshore is likely to affect Temperate Conifer Forests and Temperate Grasslands in the western U.S. disproportionately. The least impacted habitats are: Tundra; Boreal Forest; Tropical Dry Forests; Flooded Grasslands; and Tropical Moist Forests. All of these habitat types have less than 150 km² impacted by energy development in the Reference Scenario and less than 600 km² impacted by energy development in the Core Cap-and-Trade Scenario, using the minimal sprawl estimates from Figure 3.



Table 1. Minimum new area (km²) of habitat types impacted in the U.S.

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The major habitats impacted by new energy development also varied among scenarios for certain

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The Environmental Impact Statement is anticipated to be completed in late 2010 and will be available at <http://www.usda.gov/rus/water/ees/ea.htm>.